MIT's Oldest and Largest Newspaper

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The Tech

Established 1881

WEATHER, p. 2

THU: 60°F | 50°F Mostly cloudy

FRI: 59°F | 54°F Mostly cloudy

SAT: 60°F | 57°F Mostly cloudy

Volume 136, Number 26

Thursday, September 29, 2016

With plan in place, MIT takes action to reach climate goals

Zuber formed advisory committee of 20 in order to bring new ideas

By Vivian Zhong

STAFF WRITER

Spearheading efforts to combat climate change on MIT's campus and worldwide, the Office of the Vice President for Research and other departments are enacting components of the Plan for Action on Climate Change released last October and revised in March.

These include the formation of an advisory committee and an upcoming ethics forum, and the creation of a "living lab on campus energy usage" to track progress toward achieving carbon neutrality.

The plan was originally announced last October and updated in March after negotiations with student group Fossil Free MIT.

Maria Zuber, Vice President for Research, said that most of the feedback on the original plan was positive. In fact, complaints that MIT was wasting resources on combating climate change actually outnumbered protests that the plan was insufficient.

The most public criticism came from FFMIT, whose demands for divestment have been rejected.

Enacting the plan, Zuber said, will be very "human intensive," and raising more money will be necessary to fund the outlined initiatives.

Asked if the plan will benefit from any portion of the $5 billion that MIT hopes to raise through its Campaign for a Better World, Zuber said that funds will definitely be "going to the health of the planet."

Zuber's team is working in conjunction with the Office of Sustainability, the Environmental Solutions Initiative, and various other campus organizations.

Zuber spoke to *The Tech* on Monday about MIT's progress toward fulfilling this plan, in particular the goals outlined in the March updates to the climate plan.

Advisory committee to be composed of members from all pockets of MIT community

This past spring, Zuber created an advisory committee for the plan, comprising 20 members.

The committee plans to meet monthly. Beyond advising, it is tasked with coming up with new ideas to facilitate the plan.

Climate, Page 13

LUCAS C. PEREIRA SILVA

A member of the class of 2018 gets a sandwich from a Bon Me food truck during an event sponsored by the Class Council last Friday.

IN SHORT

This semester's final exam schedule is available at *http://finals.mit.edu/*

Flu shots will be available free in Walker Memorial Oct. 5 and on the second floor of W20 on Oct. 20. Both clinics will be open 10 a.m. to 4 p.m. Details for pediatric and pregnant patients are available at *https://medical.mit.edu/flu*

When scheduling events, consider consulting the GIR final exam schedule in order to avoid major conflicts. It's available at *http://registrar.scripts.mit.edu/yourexams/*

Add date is Friday, Oct. 7. That is the last day to add classes and change grading options.

Send news and tips to *news@tech.mit.edu.*

Annual report from MIT Police shows 3-year trends in crime

Reports of arrests for alcohol and drug abuse violations have decreased steadily, no hate crimes were reported

By Anshula Gandhi

A student igniting a poster in a common area and another student tossing a flaming pillow in a dumpster were just two causes of fire reports made to the MIT Police in the past three years, according to the 2016 Annual Security and Fires Safety Report.

The report, emailed out on Tuesday, seeks to inform students about criminal activity on campus over the past three years, reiterate campus security policies, and explain preventative measures that residents can take to thwart on-campus or off-campus crime.

"Policing is as much about education as it is enforcement," MIT Chief of Police John DiFava wrote in the report, explaining its purpose.

The report also listed the numbers of crimes of various types that were reported to the MIT Police over the past three years, from 2013 to 2015.

The number of rapes reported to MIT Police has increased from 12 to 23 over that time. This may reflect higher crime reporting rates, rather than higher rates of crime, due to increased awareness of resources available to assist students in reporting crimes.

On the other hand, reports of arrests and disciplinary action for liquor law and drug abuse violations have been steadily decreasing over the past three years.

Reported cases of arson and stalking also have also decreased.

MIT Police received no reports of hate crimes on campus relating to disability, ethnicity, gender, or religion. Whether or not this is due to reluctance to categorize certain crimes as hate crimes is not analyzed in the report.

Only police officers and military personnel can carry weapons on MIT's campus, the report said.

Students may want to note that mace and pepper spray are also categorized as weapons, and if carried without the proper firearm registration, will result in a one-year minimum jail sentence.

Only seven of the report's 56 pages focus on fire statistics and safety. The vast majority of the document details security policies and urges students to take proper precautions.

Much of the information available in the report might already be considered common knowledge on campus. For example, the handbook encourages students to avoid leaving bags unattended, use a bike lock, be careful with drugs and alcohol, and get renter's insurance.

Other advice may be less common knowledge. For example, in the case that students encounter an intruder, they are encouraged not to act "heroically" and confront them. Instead, they're urged to take note of the intruder's appearance, age, height, weight, and clothing, and call the MIT Police as soon as possible.

Crime reports can be made to the MIT Police at (617)253-1212, or anonymously at (617)-258-8477.

Delta Phi Epsilon starts year with a new house in Boston after search

The 1-year-old sorority moved into house at 515 Beacon Street still owned by Sig Ep

By Patrick Wahl

Members of MIT's newest sorority, Delta Phi Epsilon, have moved into their recently-acquired brownstone house at 515 Beacon Street in Boston.

The house is owned by the Sigma Phi Epsilon fraternity and was secured for Delta Phi Epsilon by the sorority's national headquarters. It is reportedly being rented at $55,000 per year.

Eleven members currently live in the house, populating nine single occupancy rooms and one double. "We're a smaller sorority, so we all know each other and we're pretty happy to be living with each other," said Vice President of House Management Aasavari Phanse '18.

The chapter conducted formal recruitment for the first time this fall, gaining about 20 new members, Phanse said. Recruitment last year was run by Delta Phi Epsilon headquarters staff along with area volunteers, after other sororities had completed their formal recruitment periods.

This year, members prepared for the events with a recruitment boot camp held in the house.

"It was … a little bit stressful over the summer," said Phanse. "We didn't get to see as much of [the house] as we wanted to." The house was continuously occupied by individual tenants until the sorority moved in for the start of the school year.

However, Phanse has found 515 Beacon pleasant so far. "It's actually really pretty. There's a lot of really nice woodwork and so I'm really excited about it," she said.

DPE, Page 15

COPING WITH LOSS

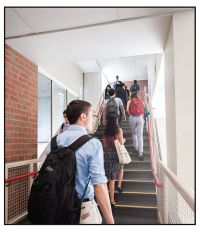
How to be there for friends. **CAMPUS LIFE, p. 7**

A MILLENIAL OPERA

Is *Carmen* too scandalous?. **ARTS, p. 10**

ZOMBIES!?

A new kind of tech revolution. **CAMPUS LIFE, p. 7**



FALL CAREER FAIR

Course 6 Appreciation Day. **PHOTO, p. 8**

RUN RUN RUN

The value of hard work in teams. **SPORTS, p. 16**

SECTIONS

Weather. 2
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Arts 9
Sports 16

WEATHER

Cloudy weather will stick around

By Costa Christopoulos
STAFF METEOROLOGIST

Cloudy and muggy weather should continue through Friday as a front approaches Boston from the south. Warm, tropical air is being squeezed between a low pressure system to our southwest and high pressure to the northeast. Today, the vicinity of the high pressure system will limit rain chances in Boston. As the high breaks down tomorrow, an area of rain will move in from the south, bringing moderate rainfall and patchy fog. Rain chances remain high through the weekend as the persistent low to our east makes its way toward New England.

Meanwhile, the National Hurricane Center is watching a recently-developed tropical storm in the Caribbean which could potentially impact the U.S. next week. Although a tremendous amount of uncertainty remains, Tropical Storm Matthew will be closely monitored in the coming days. Several weather models show the storm trekking west before taking a sharp turn and continuing north along the east coast. Models also show the system strengthening, putting it at hurricane status in the next several days. Its implications for the east coast will be more certain by the end of the weekend.

Extended Forecast

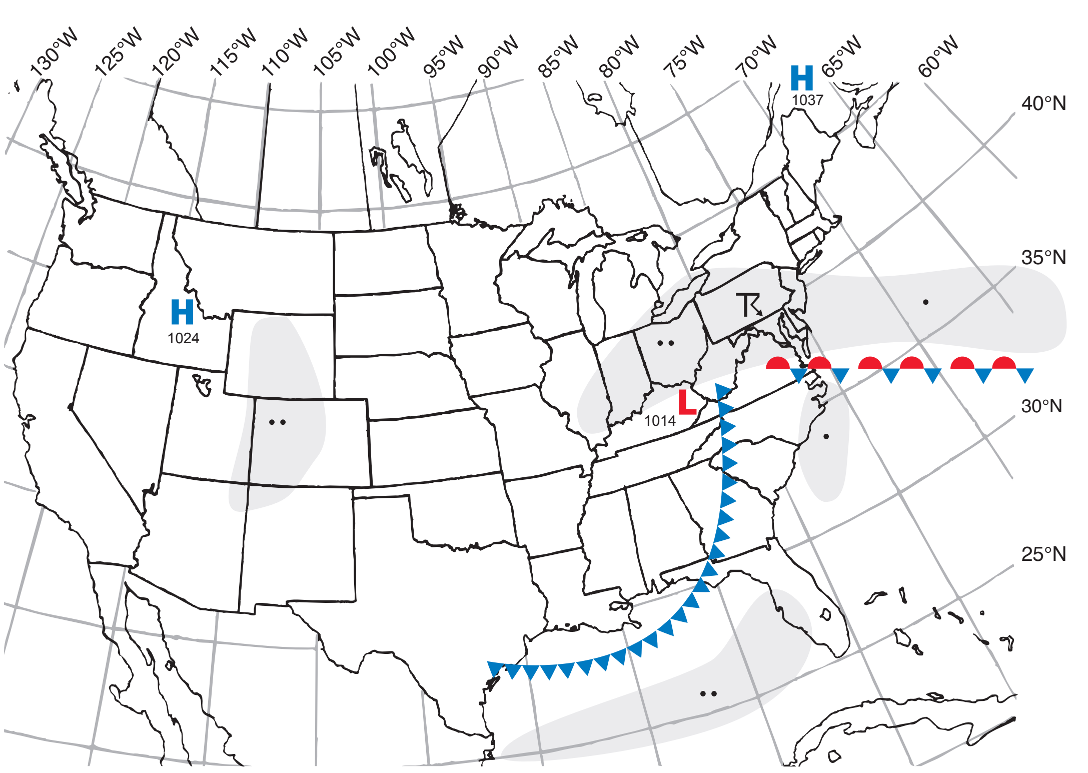
Today: Mostly cloudy. High of 60°F (16°C) . Winds northeast at 10-15 mph.

Tonight: Mostly Cloudy. Low of 50°F (10°C). Winds northeast at 10-15 mph.

Tomorrow: Mostly cloudy, showers likely. High of 59°F (16°C). Winds northeast at 10-15 mph.

Saturday: Mostly cloudy, showers likely. High of 60°F (16°C).

Sunday: Mostly cloudy, showers likely. High of 66°F (19°C).



Situation for Noon Eastern Time, Thursday, September 29, 2016

Weather Systems	
H	High Pressure
L	Low Pressure
§	Hurricane

Weather Fronts	
▬ ▬ ▬	Trough
◓◓◓◓	Warm Front
▲▲▲▲▲	Cold Front
▲◡▲◡	Stationary Front

Precipitation Symbols	Snow	Rain
Showers	✻ ▽	• ▽
Light	✻	•
Moderate	✻✻	• •
Heavy	⁂	∴

Other Symbols	
≡	Fog
TR	Thunderstorm
∞	Haze

Compiled by MIT Meteorology Staff and *The Tech*

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Sudan deployed ‘scorched earth’ tactics in Darfur

In report, Amnesty International decries human rights abuses by Sudanese forces

Somini Sengupta
THE NEW YORK TIMES

Amnesty International said Thursday that Sudanese government forces had laid waste to dozens of villages in the restive region of Darfur, bombing them from the air, burning homes, looting livestock and raping women — while preventing United Nations peacekeepers from going there to protect civilians.

In a report published Thursday, Amnesty released satellite images to show what the human rights group called the “scorched earth” tactics deployed by Sudanese forces this year in the volcanic mountain zone known as Jebel Marra. Those tactics have been deployed in other parts of Darfur since the conflict erupted there in 2003.

The group also said civilians fleeing the attacks testified about what they described as “poisonous smoke” that could have been chemical weapons. The group said it could not collect soil or blood samples as evidence, because “access to Jebel Mara is severely restricted.”

Sudan’s foreign minister, Ibrahim Ghandour, in a meeting with The New York Times editorial board on Tuesday, dismissed the allegations as “nonsense.”

“We don’t use chemical weapons in populated areas,” he said. Asked whether government forces use chemical weapons anywhere, he said they did not — “at all.”

The report by Amnesty is perhaps most notable because it describes the kinds of tactics that Sudanese forces have used for the past 13 years to crush an insurgency in Darfur — and that world powers have failed to stop, despite repeated promises to stop mass atrocities in war zones.

Sudan’s president, Omar al-Bashir, has been indicted on charges of genocide, but the chief prosecutor of the International Criminal Court has been forced to suspend the case because world powers have not moved to arrest him. Al-Bashir has long enjoyed the support of China and Russia.

Nearly 20,000 U.N. and African Union peacekeepers have been deployed to Darfur. But despite repeated requests to the government of Sudan, they have been unable to even get to the conflict zones of Jebel Marra, said a spokesman for U.N. peacekeeping, Nick Birnback.

One measure of the violence is the exodus of those who once lived there. The United Nations estimates that nearly 100,000 people have been displaced since the beginning of this year.

For over a decade, different parts of the vast region of Darfur have been convulsed by fighting between government forces, pro-government militias and rebel groups, producing a death toll that could be in the tens of thousands and displacing more than two million people from their homes.

The Amnesty report is based on what the group said were interviews with 184 survivors and witnesses of attacks on villages in Jebel Marra. They described bombings, rapes, arson and the looting of livestock, blankets and cooking pots.

“Most civilians were killed by bombs or shot while fleeing attacks,” the report said. “Government forces also killed civilians who resisted the forces’ violations, including those who resisted giving up their property or tried to prevent rapes.”

In one case documented in the report, a village elder described a raid by members of a pro-government militia known as the janjaweed. Many died, the elder told Amnesty. Those who fled could not go back to bury their dead, he said, and made their way to a displaced people’s camp.

He told the Amnesty investigators that the survivors were left with nothing to eat but bush fruits and tree leaves.

Solution to Florida

from page 6

5	1	9	4	6	7	3	2	8
3	7	2	1	5	8	9	4	6
6	4	8	9	2	3	7	5	1
7	2	1	5	8	9	6	3	4
9	8	3	6	1	4	5	7	2
4	5	6	7	3	2	8	1	9
8	6	5	2	7	1	4	9	3
2	9	7	3	4	6	1	8	5
1	3	4	8	9	5	2	6	7

Solution to Iowa

from page 6

3	1	9	8	4	6	5	2	7
6	8	4	5	7	2	9	1	3
5	2	7	3	9	1	6	8	4
2	4	6	9	8	7	1	3	5
1	7	8	2	3	5	4	9	6
9	5	3	1	6	4	2	7	8
8	3	5	4	2	9	7	6	1
7	9	1	6	5	3	8	4	2
4	6	2	7	1	8	3	5	9

Solution to Ohio

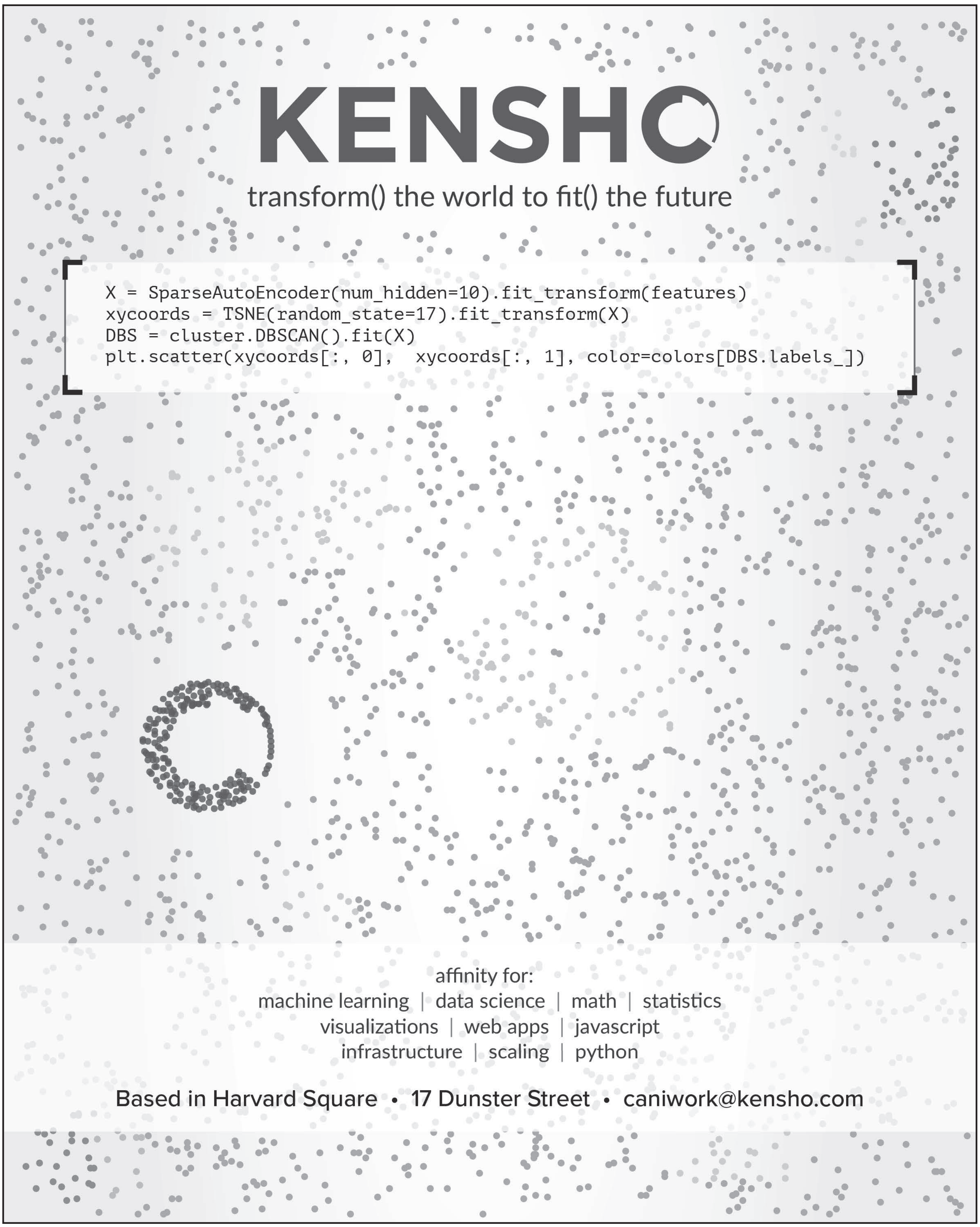
from page 6

1	3	4	6	5	2
6	2	3	5	4	1
5	1	2	4	3	6
3	5	6	2	1	4
4	6	1	3	2	5
2	4	5	1	6	3

Solution to New Hampshire

from page 6

5	1	3	6	4	2
6	2	4	1	5	3
1	3	5	2	6	4
4	6	2	5	3	1
3	5	1	4	2	6
2	4	6	3	1	5



KENSHO
transform() the world to fit() the future

```
X = SparseAutoEncoder(num_hidden=10).fit_transform(features)
xycoords = TSNE(random_state=17).fit_transform(X)
DBS = cluster.DBSCAN().fit(X)
plt.scatter(xycoords[:, 0],  xycoords[:, 1], color=colors[DBS.labels_])
```

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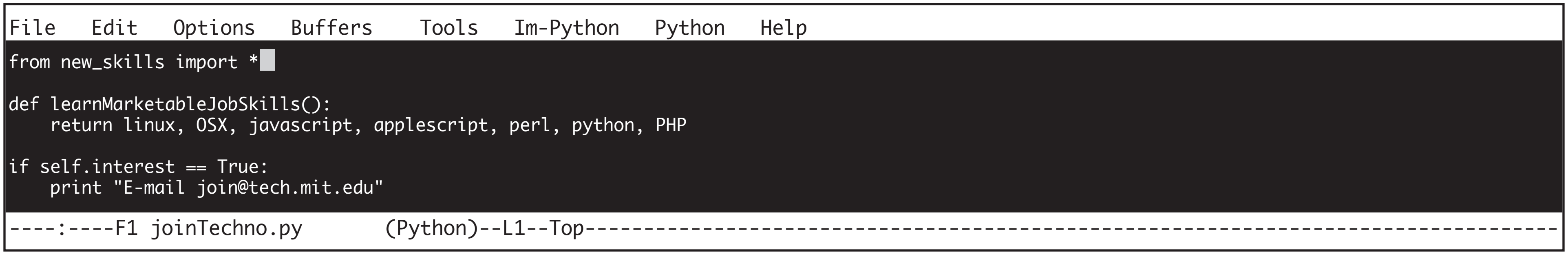

```
from new_skills import *

def learnMarketableJobSkills():
    return linux, OSX, javascript, applescript, perl, python, PHP

if self.interest == True:
    print "E-mail join@tech.mit.edu"
```

```
----:----F1 joinTechno.py       (Python)--L1--Top-----------------------------------------------------------
```

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CORRECTIONS

A caption published in last week’s issue mistakenly stated that football players knelt during the pledge of allegiance before the game. In fact, it was during the national anthem.

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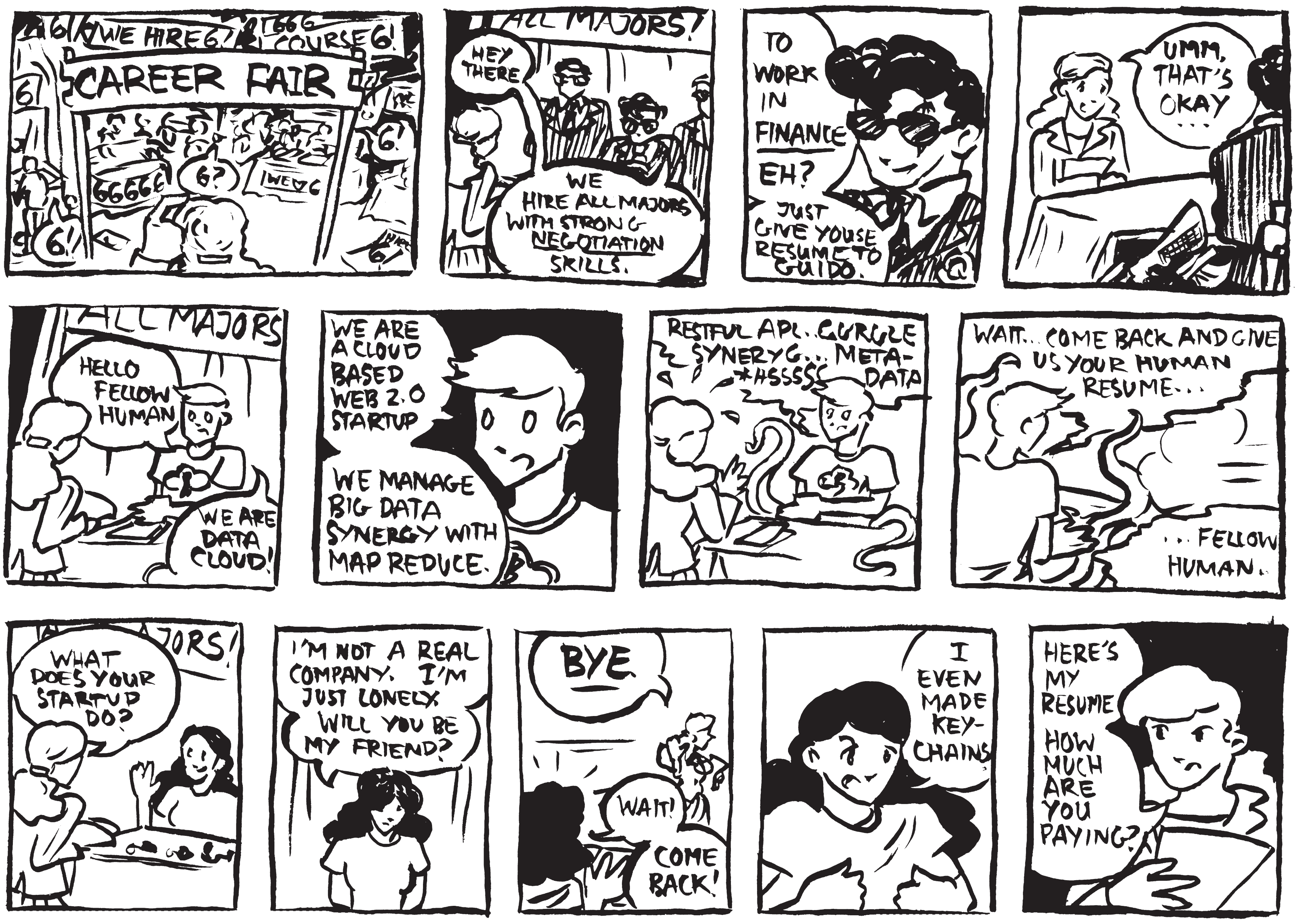
Deadline Extended!
Tuesday, October 4
esp.mit.edu/splash2016

ESP

We wear many hats at *The Tech*

Which will you choose?
email *join@tech.mit.edu*

Hey Kids!! Comix by Mehitabel Glenhaber

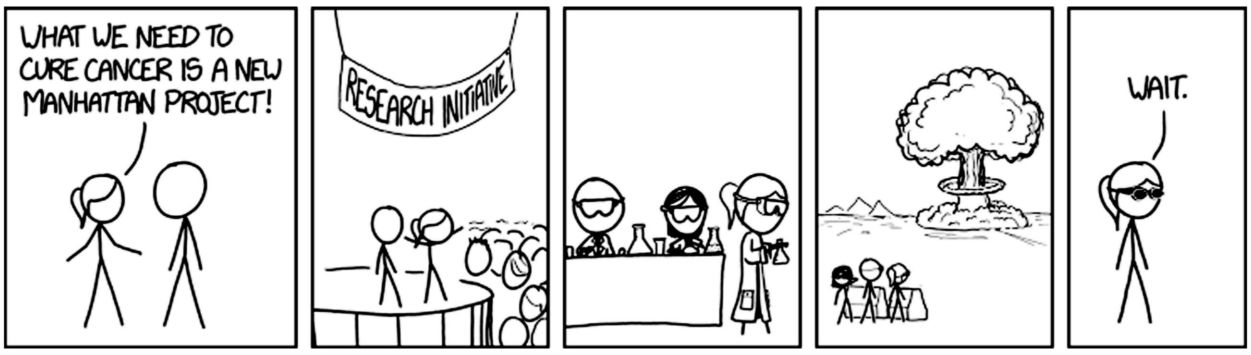

6!
WE HIRE 6?
6!
COURSE 6!
CAREER FAIR
6!
66666
6?
WE ♥ 6
6!
6!
ALL MAJORS!
HEY THERE
WE HIRE ALL MAJORS WITH STRONG NEGOTIATION SKILLS.
TO WORK IN FINANCE EH?
JUST GIVE YOUSE RESUME TO GUIDO.
UMM, THAT'S OKAY . . .
ALL MAJORS
HELLO FELLOW HUMAN
WE ARE DATA CLOUD!
WE ARE A CLOUD BASED WEB 2.0 STARTUP
WE MANAGE BIG DATA SYNERGY WITH MAP REDUCE.
RESTFUL API.. GURGLE SYNERYG... META-DATA
*HSSSSS
WAIT... COME BACK AND GIVE US YOUR HUMAN RESUME...
...FELLOW HUMAN..
ORS!
WHAT DOES YOUR STARTUP DO?
I'M NOT A REAL COMPANY. I'M JUST LONELY. WILL YOU BE MY FRIEND?
BYE.
WAIT!
COME BACK!
I EVEN MADE KEY-CHAINS
HERE'S MY RESUME
HOW MUCH ARE YOU PAYING?

xkcd

A webcomic of romance, sarcasm, math, and language

by Randall Munroe

[1736] Manhattan Project


WHAT WE NEED TO CURE CANCER IS A NEW MANHATTAN PROJECT!
RESEARCH INITIATIVE
WAIT.

On the plus side, we definitely killed that cancer over there, even if we caused a bunch more everywhere else.

Saturday Stumper by Brad Wilber

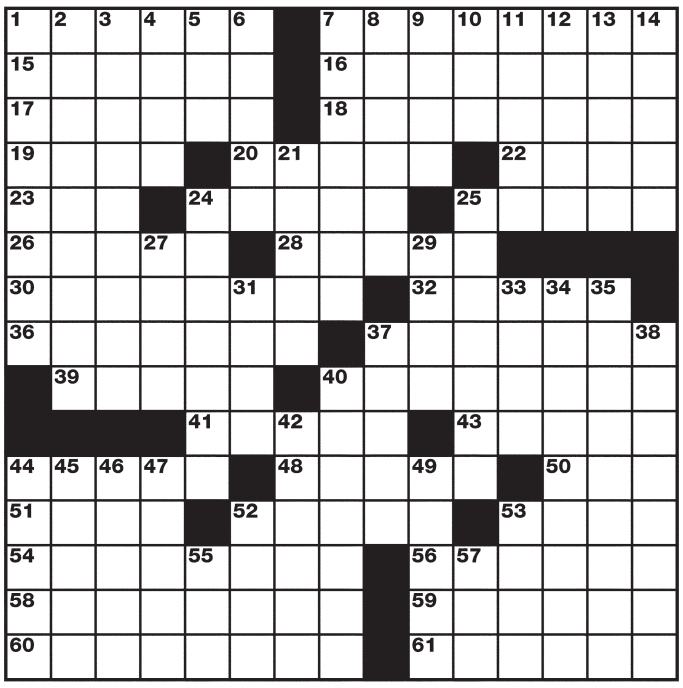
Solution, page 15

ACROSS

1 Matched in a contest
7 Shield from enemy eyes
15 Glorify
16 More than fond
17 Top male R&B artist of the ‘90s
18 Audio storage units
19 Ration
20 Humbugs
22 Unconvincing
23 “Of hasty love or headlong __”: Scott
24 You-vs.-gravity game
25 Bavaria neighbor
26 Early home of the Cuban sandwich
28 How some townhouses have gone
30 Ghost avoider since 1982
32 Raconteur in Ken Burns’ Baseball
36 Exoticleather.biz offering
37 State of succession
39 Forest harvest
40 Past
41 Leverage
43 Schumann works
44 Nietzsche antagonist
48 Tolkien trilogy, essentially
50 Bills are frequently paid for them
51 British bubbly-texture chocolate bar
52 Traditional three-layer product
53 6 Down, for one
54 Infant immobilizer, perhaps
56 Brimming with zeal
58 History class illustration
59 Keaton’s designer for Annie Hall
60 Looked at from every angle
61 Cry for

DOWN

1 Thoughtful offering
2 Prismacolor Magic Rub, e.g.
3 Ezra recounts its rebuilding
4 Improbable concoction
5 Himalayan center
6 “. . . however improbable . . .” author
7 Shape of some foreign coins
8 Evaded
9 Major macronutrients
10 Brief qualifier
11 Plebeian
12 Toward where you just were
13 Med. specialty
14 VIP at fordhouse.org
21 1500s conqueror/conqueree
24 She edited Princess Grace’s book
25 Least stale
27 Late __
29 Actor
31 Sort of troublemaker
33 “Logically, then . . .”
34 Anagram of “redaction”
35 13
37 Shuttle destination, often
38 Setting for any M*A*S*H movie
40 Memorable plain preceder
42 Veterinary specialty
44 Strands in hot water
45 Statue toppled in Kiev in 2013
46 Product of some plants
47 Certain hair dryer
49 Cut out suddenly
52 Grill
53 Setting for London’s People of the Abyss
55 Artful
57 Rural sound



Florida

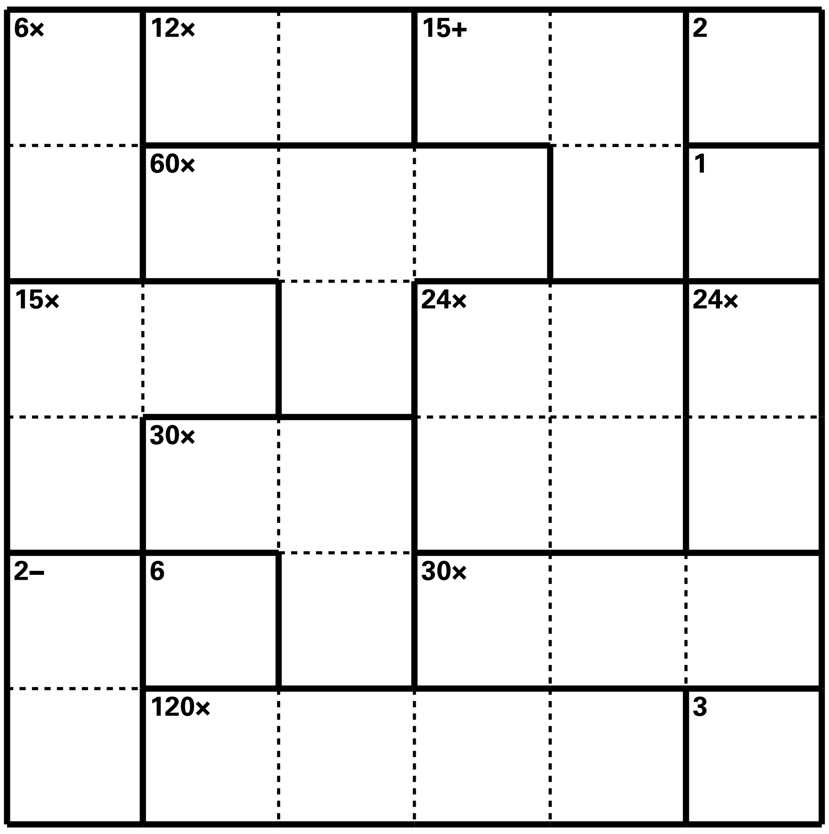
Solution, page 3

5						3		8
	7			5	8			6
	4					7		
	2	1	5					4
9	8			1			7	2
4					2	8	1	
		5					9	
2			3	4			8	
1		4						7

Instructions: Fill in the grid so that each column, row, and 3 by 3 grid contains exactly one of each of the digits 1 through 9.

Ohio

Solution, page 3



Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

Iowa

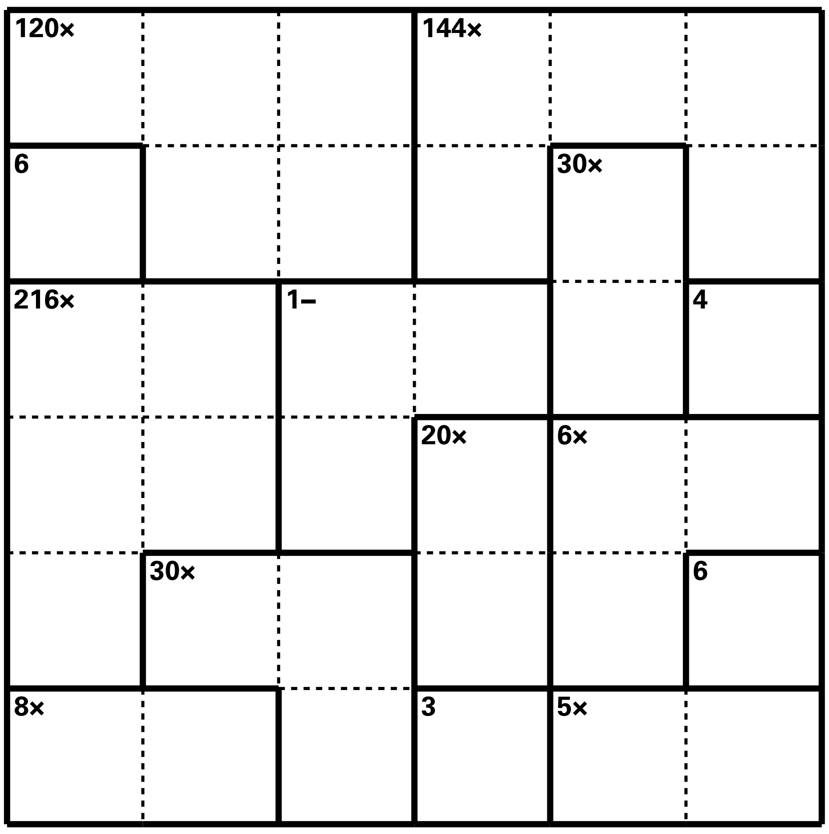
Solution, page 3

	1							7
	8	4	5		2	9		3
			3					4
	4			8		1		
1		8				4		6
		3		6			7	
8					9			
7		1	6		3	8	4	
4							5	

Instructions: Fill in the grid so that each column, row, and 3 by 3 grid contains exactly one of each of the digits 1 through 9.

New Hampshire

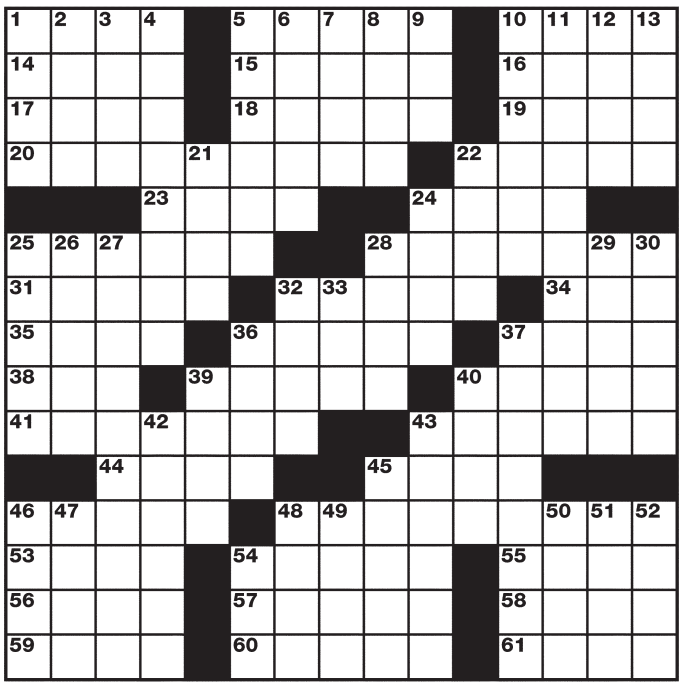
Solution, page 3



Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

Say Sew by Gail Grabowski

Solution, page 15



ACROSS

1 Gather up, as crops
5 Go off the path
10 Right away, in memos
14 Land measure
15 Residence
16 Coke or Pepsi
17 Slender
18 Didn't go out for dinner
19 Big family
20 Daytime TV drama
22 Impolite
23 Change for a $5 bill
24 "Guided" vacation
25 Fundamentals
28 Result of a salary raise
31 Make amends
32 The land along the coast
34 Mine rock
35 Canoe or kayak
36 Use a loom
37 Amazes
38 Antlered animal
39 Pulled-down window covering
40 Movie excerpt
41 After-bath footwear
43 Begins
44 When morning ends
45 Ooze
46 Uneasy feeling
48 Aretha Franklin performance
53 Dairy animals
54 Person in a clothes ad
55 Jay once of The Tonight Show
56 Maple or elm
57 Self-esteem
58 Grocery vehicle
59 Occupies a chair
60 Do the driving
61 Spanish cheers

DOWN

1 Lab-maze runners
2 Canyon sound
3 Operatic solo
4 Tip of a Bic
5 Squares and triangles
6 Carryall bags
7 One with regrets
8 China's continent
9 Strong longing
10 Increase gradually
11 "Green" electricity source
12 Cry of dismay
13 Skillets and woks
21 "__ upon a time . . ."
22 Apple's center
24 Ripped up
25 __ in the woods (innocent ones)
26 Ring-shaped reef
27 Totally drenched
28 Find a new home
29 "You __ kidding!"
30 Thumbs-up replies
32 Char, as a steak
33 Possessed
36 "At what time?"
37 Mexican resort city
39 Leopard marking
40 Flower stalk
42 Old West search parties
43 Retail merchant
45 Glove leather
46 Performs in a play
47 "Me neither"
48 Arrange in order
49 Garfield's pooch pal
50 Make watertight
51 Memo intro
52 Barracks beds
54 Army cops, for short

Too far to grieve

Coping with death on campus

By Miranda McClellan

I had watched the scene unfold twice before. In the busy shuffle between classes and club meetings, the phone call comes. My friends learn that someone they loved has died, and by physical proximity, I am the first outsider to know.

Sarah's phone call came after a 6.042 lecture. Her eyes welled with tears as her sister told her their grandfather passed away. I held her closely as she cried. I turned her away from the prying eyes of passing students in Stata and rubbed her head until she was ready to go home.

When I received news of my father's passing last May, I did not want to "perform" my grief. Instead, I stopped psetting, had a conversation with my sister over the phone, and walked back to my dorm before shedding a tear. I did not want to post carefully-crafted photo collages on social media, write paragraphs about what he meant to me, or force my grief to compete with final exam memes for likes. I did not want people to imagine me as a girl who mourns loudly, who allows emotion to overwhelm daily life.

ILLUSTRATION BY IVY LI

Crafting an image of myself continuously wailing in sadness would be false. My life continued as planned: I returned to campus after the funeral, took two exams, and completed my 6.004 project. I flew to Seattle for an internship. I went hiking, ate food, and watched film festival movies. I talked about my dad's antics as usual and only mentioned the death of my father to one new person in the last week of my internship.

I hid my sadness in the same way I sheltered Sarah's face from the public in the hall. Below my cheery surface, I harbored emotional moments: slipping out of the intern room to cry, being held by my boyfriend, giving myself headaches thinking about missed moments with my father, avoiding my mother's anxious questions. In my private life, I was free to express my grief around close friends and to perform mounting chores necessary for the estate.

My friends and I are not the only ones. Everywhere on campus, people are mourning their loved ones. They need compassion and patience, but they are much less vocal than the people who mourn their grades. Their emotional conversations happen behind closed doors. In S^3, even trained professionals can be overwhelmed by the circumstances and feel the need to redirect you to a better-prepared person. So how can we prepare ourselves to support our friends when tragedy happens?

These are helpful things that people did for me, and things I wish I'd done for other people:

When something happens, call. Calling shows your commitment to listen and a willingness to take time out of your day. No one wants their grief to be just another passing theme in the group chat.

Explicitly ask people how they are doing and how their family is coping.

For the person experiencing loss, telling a group of people one at a time is exhausting, so let other close friends know what happened.

Encourage them to be with family even if it means missing a week of class. If they can't because of distance or price, offer to hang out more — relieve the pressure they feel to perform as though nothing is wrong. Don't let your friends feel sad, lonely, and overstressed.

Keep checking up on them.

Mourning continues for months or years after the event, but we can easily forget someone else's grief as we continue our own routines. Simple things like eating together, praying together, watching cat videos, or doing puzzles can ease a grieving soul. Create an environment for your friends such that no place is too far to properly grieve, because every place can be a home.

A MISTI SUMMER

Virtual reality zombies in Berlin

Learning about brain-body relationships

By Paloma Francisca Gonzalez Rojas

During the summer, I traveled to Berlin to work at the BeMobi Lab, a lab focused on spatial cognition research at the Technical University of Berlin, Germany. Seeing Berlin excited me; it is such a historical city with sites such as the Berlin Wall, and it is one of the radical art hotspots of the world right now. I went to see many art shows and public celebrations, and I hung out with Berlinese in the parks and squares. It was also fantastic to finally see the big lab directed by Professor Klaus Gramann and to meet my German colleagues there.

My most exciting experience was getting to use their virtual reality headset with motion tracking technology and their mobile electroencephalogram imagining cap (EEG). The EEG is a cap full of electrodes that reads electric impulses from the brain. The Bemobi has a special type of EEG cap which allows you to walk while using it. I loved having the opportunity to combine such great technologies together. It is so easy to create new immersive worlds and new architectures with VR. However, the highlight of my summer was using the mobile EEG which allowed me to take a glimpse into other people's brains while they moved and interacted with space.

To my surprise, the main challenge we faced in our experiments was minimizing how sick people feel after using the VR goggles for too long. A typical young student in perfect health lasted between 10 and 20 minutes, which is nothing for a cognitive experiment — especially for experiments testing perception of space. Participants usually have to wear the EEG cap and perform spatial tasks such as walking on trails — paths testing how perception changes with movement — and need to do several repetitions to get good data. In the spatial experiments that involved moving with a keyboard or control and seeing the space change in VR, none of the participants could stand longer than 20 minutes.

> **Our brains get lost when our eyes inform us that we are in motion, but our bodies are not moving, which is a problem for static VR.**

Our brains get lost when our eyes inform us that we are in motion, but our bodies are not moving, which is a problem for static VR. We realized that the trick to designing feasible experiments was to have people move in real space while in VR, so we made people walk, jump, and run around the lab while wearing the VR goggles.

Because my research pertains to how people perceive space while in motion, or human-space interaction as I call it, I thought that analyzing people's brain activity while they move was important. I turned out to be right, but not for my original reasoning. New designs for the experiments were developed accordingly — no more static experiences, just motion.

In the end, we had our participants acting like zombies. They walked without apparent direction inside a dark room and followed the VR world in their eyes without a clue about what was happening in reality. The VR experience was designed to be an infinite path; controlled by motion tracking, the path disappeared when the "zombie" reached the end of the real space inside the lab. Another path would then appear going in the opposite direction, endlessly.

Zombies walked back and forth, back and forth, in straight trajectories, in zigzag trajectories, or in undulating trajectories. In VR we had high walls, medium-height walls, and short walls, all to make participants react with their bodies to things only their minds could see. Some people were quieter, and others moved strangely in the corners of the zigzags or at the curved walls. Someone had to stay watching them at all times because they were completely disengaged with their actions, like actual zombies.

These zombies, loaded with technological gear, walked for hours and hours while we observed their brain activity. Soon, I'll get to the point where I can actually analyze this data in order to understand how their reactions were processed by their brains. It was amazing to learn how important the relationship is between brain and body, or so-called embodied cognition. While observing how they moved, I could almost see how they were thinking about the space in VR. In the experiments, it was almost as if we could control their brains. Maybe in some distant or close future we will, and I am glad I got to have a role in this enterprise.

MISTI — MIT International Science and Technology Initiatives — is MIT's pioneering international education program. Each year nearly 1,000 MIT undergrads and graduate students are matched with hands-on international projects through MISTI. To learn more about internship, teaching and research opportunities across the globe, check out misti.mit.edu.

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The Tech is collecting successful application essays (**hint:** yours!).
Email your pieces to cl@tech.mit.edu!

MATI K. ALEMAYEHU

MATI K. ALEMAYEHU

MIT Career Fair 2016

DAMIAN S. BARABONKOV

The MIT Fall Career Fair last Friday connected over 400 companies with over 4500 talented students. It was the year’s largest recruiting event which served as an opportunity to find potential employment or merely top up your wardrobe with free swag.

MATI K. ALEMAYEHU

MATI K. ALEMAYEHU

MATI K. ALEMAYEHU

CONCERT REVIEW

A look at FredFest

Performances electrify East Campus Courtyard

Fredfest IX

Performing Artists: Bent Knee, The So So Glos, and Palehound

East Campus Courtyard

Friday, September 23, 2016

YUANCHENG YU—THE TECH

The ninth annual FredFest, MIT's largest local music concert and free to the community, took place in East Campus Courtyard on Friday.

By Ivy Li

An eclectic mix of band performances ranging from avant-garde to punk rock, East Campus's annual concert FredFest is a reflection of the dorm community itself: idiosyncratic yet inclusive. Despite the looming rain clouds above, this local venue saw EC residents running after Domino's pizza, audience members sitting on large beanbags in the courtyard, and band members of Bent Knee checking the sound on stage.

Kicking off the concert was Boston group Bent Knee with a statement from guitarist Ben Levin, who explained his connection to MIT: his parents were former alumni who had met on campus and he was excited to perform at their alma mater. The performance that followed was a series of experimental yet enchanting songs. Vocalist Courtney Swain uses her voice as a dynamic instrument, from the fierceful cry of "I imagine your dead body" in "Being Human" to the lilting words of "I Don't Love You Anymore" and even to wordless vocals — almost screams — that harmonize with vocalist and bassist Jessica Kion's vocals. Their repertoire was linked by a common theme of deprivation and loneliness, yet rather than sounding severe, their performance was whimsical and at times even mystical. Chris Baum's violin ranged from mellow to piercing, interweaving with Gavin Wallace-Ailsworth's flurry of percussion. Disparate as they may seem, the voices and instrumentals threaded together into a charming portrayal of their art.

After a brief intermission, Brooklyn's punk rock band The So So Gloscame out to perform, with some highlights including "Going Out Swingin'" and "Lost Weekend." The atmosphere shifted as the group began interacting with the crowd and filling the venue with catchy, upbeat songs. Percussion rang loudly while wild guitar riffs backed Alex and Ryan Levine's insightful lyrics. But the instrumentals did more than just support their lyrical pleas. They excited the words. They intensified them. Lyrics that might not have been so catchy or hard-hitting otherwise became tasteful commentary, such as "I'm a too-much-information-generation cliche, tomorrow's just a yesterday's to-do list away" in "A.D.D. Life," and "just to get you off my mind, I took a pill just to kill time" in "Devils Doing Handstands." Both pensive and upbeat, the lyrics endorsed a sense of social justice amidst the thundering instrumentals.

After The So So Glos left the stage, Boston indie group Palehound began to set up their instruments as the rain grew heavier. Despite the weather, the group began playing their song "Healthier Folk." Lead vocalist Ellen Kempner would at times croon her words, almost muttering. Her lyrics elicited jarring emotions — "drizzle honey on my open salt wound." After the song's conclusion, Kempner apologized for the pouring rain, telling the audience that they could run back into the dorms and that she would not be offended. The vast majority of the crowd remained as the rain continued, and Palehound played one last song: "Cinnamon." The song began with mellow guitar and Kempner's pensive voice. Suddenly, her voice veered to a guttural bellow as she sang "came down and rocked me" before the song returned to its dreamlike, sincere beginnings. While the rain poured on, the crowd remained outside until the last note was played.

MOVIE REVIEW

Dark comedy and stunning fashion shine in Jocelyn Moorhouse's newest Australian film

Laughter abounds with Kate Winslet and the delightfully quirky cast of The Dressmaker

COURTESY BROAD GREEN PICTURES

Kate Winslet stars in The Dressmaker

By Krystal Lai

Picture a small, dusty town evocative of the American Wild West. Now, in lieu of cowboys, gunslingers, and rugged beards, imagine a small pack of women milling around town aimlessly, leaning dramatically against pillars, and stretching theatrically atop ladders, all while dressed in the finest haute couture more appropriate on a Milan or Paris runway rather than in the Australian Outback. It is precisely this sort of visual and contextual dissonance successfully powering the darkly comedic engine of *The Dressmaker*, an Australian film directed by Jocelyn Moorhouse, that keeps the viewer engrossed and laughing for the majority of its 118-minute runtime.

Myrtle "Tilly" Dunnage (Kate Winslet) returns as the titular dressmaker to Dungatar, her childhood town, in a melodramatic swirl of dark shadows and glamorous fashion, both literally and figuratively. She arrives in the middle of the night, suddenly, resplendent in a self-made black dress that the amiable and delightfully theatrical Sergeant Horatio Farrat (Hugo Weaving), admires, rather astutely, as a Dior-inspired creation. In line with the high-fashion designs of Tilly Dunnage, Moorhouse presents a highly-stylized film that is colored in rich and saturated tones that pop against the pale beige dust clouds of the Australian Outback. Unexpected camera angles and close-ups give this film a fresh visual spin.

To the surprise of the eclectic cast of townspeople in Dungatar — who include Tilly's own mad, solitary mother Molly (Judy Davis), a hunchbacked chemist who cannot stop running once he starts, an old gossip who spends all of her scenes eating hash brownies, and a grieving mother who has minor panic attacks whenever someone steps off the meticulously laid out newspaper trail in her hallway — Tilly has come back to investigate the murder of a young boy that she had been accused of committing just prior to her shameful exile so many years ago. Though most of the town is quick to dismiss Tilly's objections to her guilt, she finds support in Teddy McSwiney (Liam Hemsworth), a local farmer with whom she strikes up a romantic relationship. Despite the charming allure of the two lead actors who have proven themselves in the past as compelling romantic leads, the scripting of this relationship makes it seem too sugar-sweet and trite, making it seem more of a functional plot device than an emotionally-relevant connection.

The first two thirds of the film are focused on the murky circumstances of the murder, propelled along at a comfortable pace by the town dynamic and the clues and twists that Tilly begins to dig up. The plot also benefits from wheels greased by well-timed laughs and surprises.

A key contributor to this dark levity is Judy Davis, an Academy Award nominee and two- time BAFTA winner, who truly shines as Mad Molly, Tilly's wild-eyed, snarky, and unabashedly blunt mother. Her performance is so nuanced that she manages to create a character who strikes both a sympathetic and comedic chord throughout the film, whether she is grappling with the frustrations of a fading memory or taking stealthy sips from someone else's hip flask.

Perhaps most scene-stealing of all, however, are the costumes themselves. Designed by Margot Wilson and Marion Boyce, the high fashion dresses that invade this sleepy town stand on their own as stunning works of art and design, from the magnetic red dress that draws the gaze of every rugby player in Dungatar to the crisp white pleats of a shawl reminiscent of majestic bird wings. In addition to her investigative bent, Tilly also shakes the town up by providing them with these impressive creations, turning heads and changing minds about the power of tasteful fashion.

The film falters in its third act with a rapid-fire series of bizarre and tonally dissonant events that leave the viewer reeling at the suddenly overbearing solemnity and darkness. Like the relationship between Tilly and Teddy, these scenes appear to serve simply as an inciting force and motivating cause for the protagonist. However, this build-up ultimately leads to a tonal return to form in the film's climax in which revenge is finally, and quite satisfyingly, served.

The final scenes only reiterate the dark humor, spectacle, and strong cast of characters that continuously elevate this film from a simple mystery or revenge comedy-drama into an entertaining, engaging, and visually delightful experience.

★★★★☆

The Dressmaker

Directed by Jocelyn Moorhouse

Starring Kate Winslet, Liam Hemsworth, Hugo Weaving, Sarah Snook, Judy Davis, Caroline Goodall

Rated R

Now Playing

OPERA REVIEW

Carmen sets out to shock: opera for millennials

Boston Lyric Opera stages memorable production of a popular favorite

T. CHARLES ERICKSON

Carmen (Jennifer Johnson Cano) scrawls "love" on the chest of soldier Joseph Yonaitis in Boston Lyric Opera's production of Georges Bizet's *Carmen* directed by Calixto Bieito. *Carmen* opens BLO's 40th season, at the Boston Opera House through October 2.

By Alexandra Sourakov
ASSOCIATE EDITOR

"Love" and "death" sound remarkably similar in French: *l'amour* and *la mort*. This near-homonymity is the thematic core of the opera *Carmen*. The titular main character is inexorably drawn to the two. She captures the heart of a naïve soldier, Don José, but valuing freedom above all else, she cannot remain constant for long. His obsessive love for her leads to her death.

Mezzo-soprano Jennifer Johnson Cano is a powerful, seductive Carmen. A friend, who accompanied me to the performance, observed that she sings quietly enough that you have to lean in to hear but not so quietly that the words are lost. Carmen is such a magnetic character, both musically and intrinsically, that those selected to play her lover, the soldier Don José (in this case, tenor Roger Honeywell) are inevitably overshadowed. However, although Cano plays a great Carmen, Elīna Garanča in Richard Eyre's stunning production of *Carmen* remains unmatched.

It is the staging of this production that makes it memorable. Gone are the flowing skirts that adorn the Gypsy girls. Gone are the wonderfully choreographed group dance numbers at the bar "Lillas Pastia." The stage is stark and sparsely decorated, but the use of dynamic props, like six fully-functional 1970s-era automobiles which are driven or pushed across the stage, stave off potential dreariness.

In standard Carmen productions, such as at the Met, Acts I and II are uplifting — we are shown a Carmen who is in the center of her microcosm, who feeds off being the center of attention and the object of desire. But in Bieito's production, Carmen comes across as someone to be pitied. Yes, she is strong, but she is surrounded by loose, boozy women and vulgar soldiers in post-Franco Spanish North Africa. She is not the object of admiration, but of animalistic sexual desire, and she seems so very lonely. Perhaps this is Bieito playing devil's advocate to Bizet's romantic rendering of a Gypsy's lifestyle.

Bieito's *Carmen* is a tribute to Bizet's original in a subtle way as well: in this production, musical numbers were separated by dialogue. I had never seen this in an opera, and it left me a bit befuddled until I did some research, but it turns out that this is the style of *opéra comique*, the genre in which the opera was originally written. Since the time *Carmen* was first staged, spoken dialogue became increasingly replaced by the recitative (sung ordinary speech), which then became the norm. Bieito foils expectations by reverting to the original style.

Clocking in at about three hours, with only a few main characters and a plot that is easy to follow, not to mention an extraordinarily catchy score and libretto, *Carmen* is the gateway drug of operas. Even so, opera as a modern art form has been struggling to overcome its reputation as the pastime of the elite or the pretentious.

In my experience, in America, the demographic in an opera house is so skewed that septuagenarians are serious contenders for belle of the ball. For those producing operas, this is an alarming occurrence. So what must the opera do to appeal to rising generations?

Darwinians would say, of course, that opera must evolve to suit its new environment, which is very different from that of its "golden age" of the mid-19th century.

Calixto Bieito's new production, marking his U.S. opera debut, demonstrates that he is ready to serve as a catalyzing mutation. Conservative values are stripped away (in one scene, quite literally 'stripped,' when a soldier performs a dance number without a scrap of clothing on). Bieito does not shy away from explicit portrayals of sexual violence, vulgarity, and indecent exposure, although even these are mild by modern television standards.

Now, how did the audience respond to this upheaval of propriety? If one wants to gauge the general opinion of a piece, one's best resource is the lady's room during intermission. Opinions are like bladders – everybody has one. The appraisal of the first two acts of *Carmen* was bimodal: some absolutely loved it (this crowd was generally under 30 years old), and others shook their heads woefully and said this certainly wasn't their "grandmother's opera." The irony is that when Bizet originally had his opera staged in 1875 at the Opéra-Comique in Paris, the reaction of the traditionalists was similar, and he was devastated to the point that… well, you can read his biography.

The latter cohort probably reacted the same way upon seeing some audience members wearing flip-flops and T-shirts. I am not highbrow when it comes to clothing and I can appreciate the comfort of a good T-shirt as much as the next MIT student, but there is a time and place for everything.

Going to the opera (or the theater or the ballet) is an experience beyond just viewing the performance. It starts as you're entering the opera house: being the opening night, the dress code was "Creative Black Tie" and there were some truly magnificent dresses and suits on display. The experience continues as you contort yourself to squeeze past the knees of your neighbors to reach your red, velvety seat. Then, while you're admiring the frescoes on the ceiling and the chandeliers, the lights dim and the overture begins.

Bieito, in collaboration with Boston Lyric Opera and the San Francisco Opera, is bringing three more productions to Boston in the coming months. The next one, *Greek*, a retelling of Sophocles' *Oedipus the King*, will open in November.

★★★☆☆

Carmen

Directed by Calixto Bieito

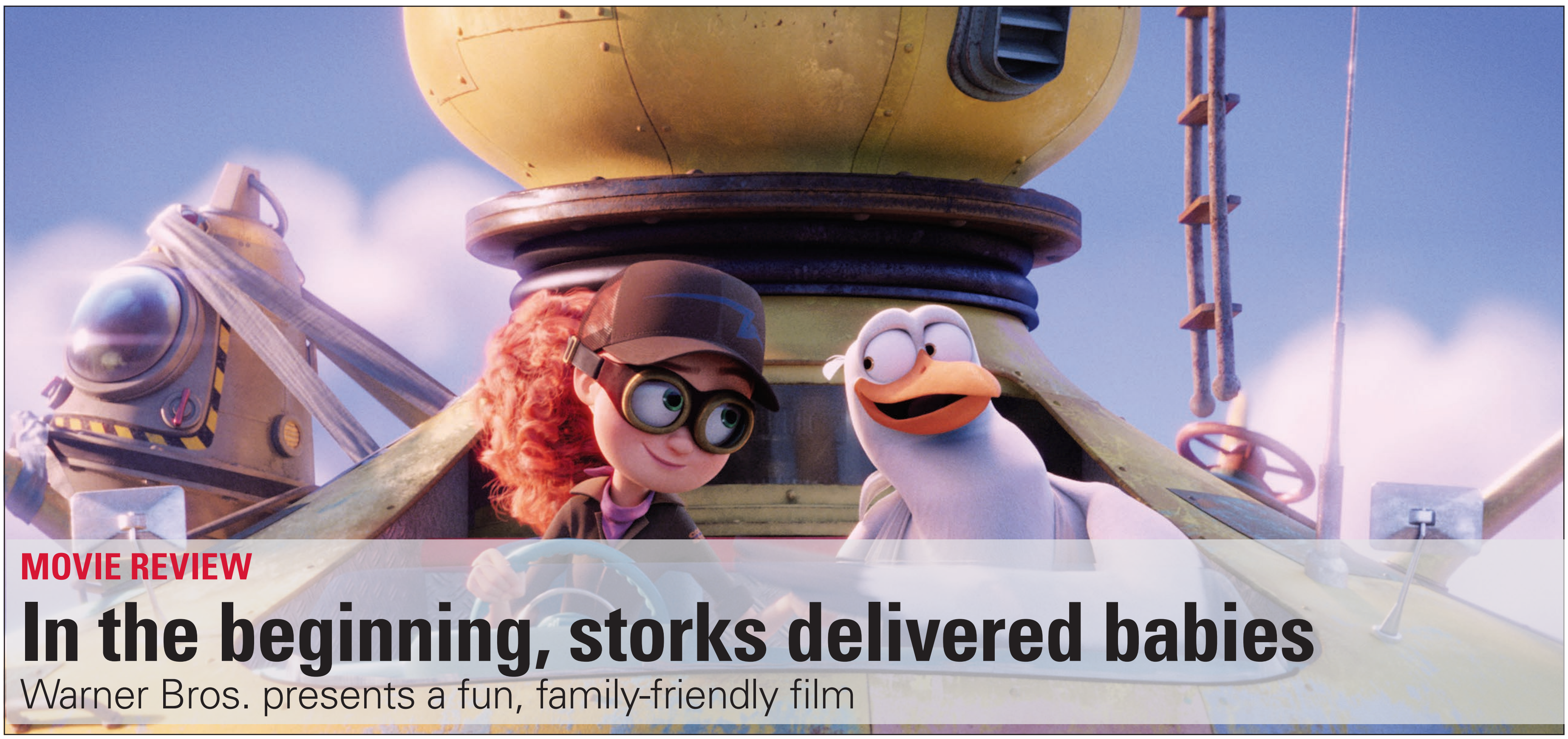
Starring Jennifer Johnson Cano, Roger Honeywell, Michael Mayes

Music by Georges Bizet; Libretto by Henri Meilhac and Ludovic Halévy

Boston Opera House

539 Washington St, Boston MA

Sept. 23, 25, 30, and Oct. 2



MOVIE REVIEW

In the beginning, storks delivered babies

Warner Bros. presents a fun, family-friendly film

COURTESY WARNER BROS. ENTERTAINMENT INC.

(L-R) Tulip voiced by Katie Crown and Junior voiced by Andy Samberg in the new animated adventure *Storks*, a Warner Bros. Picture release.

By Rona Wang

Storks presents a new twist on the classic notion of "storks delivering babies." After a human girl named Tulip (voiced by Katie Crown) is orphaned in a stork-related disaster, storks give up their high-pressure gig and now deliver for an online store reminiscent of Amazon.com. Junior (voiced by Andy Samberg), is up for promotion, but in order to get the job, he has to fire Tulip, working at the warehouse due to a lack of a human home, who doesn't fit in with the storks — after all, "birds of a feather flock together."

But Junior can't go through with the firing, and instead, he relegates Tulip to a mundane job intended to get her out of the way. This backfires and leads to a series of accidents that might cost Junior his promotion. With his career hanging in the balance, Junior has to journey with Tulip to search for the right family. Hijinks include a high-stakes chase from wolves and a confrontation with the stork who orphaned Tulip many years ago. Unfortunately, the trade-off in the action sequences is depth: there is no emotional resonance to these scenes, and hence, they're simply physical obstacles in between Point A and Point B.

While the colorful animation is fun and eye-catching, the true emotional heft of the story appears in the theme of family that ties the movie together. All Tulip has wanted for 18 years was to find her place. She doesn't belong with the storks; thus, she doesn't belong anywhere at all. This longing propels her on an adventure to find the family she should've been delivered to, 18 years ago.

However, the character development in *Storks* leaves the reader with too many questions. We are not given enough motivation for why Junior wants his promotion — in fact, when prompted by Tulip, he admits he doesn't even know why himself. Perhaps this is a commentary on the instinctive drive to ascend the ladder in a hierarchical world. Viewers are never given the chance to see any of Junior's backstory, and thus, he remains an enigma.

Overall, *Storks* is an action-packed animation that will be enjoyable for an hour and a half, but unlikely to leave much emotional impact on viewers.

★★★☆☆

Storks

Directed by Nicholas Stoller and Doug Sweetland

Starring Andy Samberg and Katie Crown

Rated PG

MOVIE REVIEW

Kidnapping, Korean film, and Kim Jong Il take center stage in gripping documentary

The Lovers and the Despot delivers a truly bizarre must-see true-crime thriller

★★★☆☆

The Lovers and the Despot

Directed by Rob Cannan and Ross Adams

Not Rated

Now Playing

By Krystal Lai

North Korea is a black box that always seems to be lurking in the news with headlines that range from the shocking to the downright bizarre. *The Lovers and the Despot*, directed by Rob Cannan and Ross Adams, straddles both the shocking and the bizarre as this documentary unpacks the compelling true-crime story of Kim Jong-Il's kidnapping of famed South Korean actress Choi Eun-Hee and her ex-husband, the accomplished South Korean director/producer Shin Sang-Ok.

Covering events that took place over 30 years ago in the media-adverse North Korea, this documentary relies primarily on the narration of present-day interviews to drive the story and on photographs, old film footage, and stylized reenactments to revitalize it on film. Perhaps the most captivating element that Cannan and Adams have to offer are the recordings of conversations held with Kim Jong-Il himself that the captives Choi and Shin were able to capture by hiding voice recorders on themselves. Their high risks had high rewards. Hearing the dictator speak in his own voice is an intriguing prospect and as one interviewee mentions, an uncommon occurrence. Audiences are granted clearly captioned access to these recordings in addition to an intriguing insight into the mannerisms, off-beat humor, and intent of this enigmatic figure. In what is perhaps the most memorable and bizarrely hilarious line of the film, Kim refers to himself as being as "small as a midget's turd.

Cannan and Adams set the stage for this international caper by introducing the first two-thirds of the titular trio, Choi and Shin, as the Lovers. Despite a successful partnership in the South Korean film industry and an apparently happy start to their marriage, Choi and Shin ultimately part ways and divorce after Shin fathers two children with another woman. Much of this relationship is detailed from the personal perspective of Choi, but it is only after this expository narrative is established that the thrilling ride truly begins.

The film does not break new ground with its musical score, but instead treads the familiar yet highly effective path of subtle and slowly building sound that utilizes both crisp silences and eerie static for full dramatic effect. It is in this soundscape that we first learn of Choi's disappearance from a Hong Kong hotel and are catapulted into the world of shady boat kidnappings, fights, imprisonment, and escape attempts. Twists and revelations are dropped so frequently and abruptly that, while highly entertaining, it all borders on the absurd — a sentiment which is only amplified once it is revealed that Kim has kidnapped these South Korean film industry juggernauts for the sole purpose of making great North Korean films. A self-proclaimed artiste who complains about the overabundance of "crying scenes" in Korean film, Kim hopes to demonstrate that North Korea is also capable of great art. And to some extent he succeeds, with Shin and Choi crafting a prolific number of inventive films while in captivity.

Though the documentary begins with the broken relationship between Choi and Shin, once it plunges into the drama of intrigue, oppression, and escape, it does not return to it, rendering the film as two disjointed halves and leaving the viewer wondering what, if any, significance the relationship had. The two could have been strangers and the story might have been just as functional. Equally confusing is the director's use of film footage from old Korean films in conjunction with reenactments of key events in the story. While this is not inherently confounding, it is the unusually similar visual style that these two share that makes it difficult for viewers to distinguish between the two. One could argue that the directors are commentating on what one interviewee describes as the blurring of films with real life. But regardless of intent, this and other choices, such as only flashing the names of interviewees once before they speak, despite the wide collection of characters that can be hard to keep track of, muddle the flow of the viewing experience.

1983년10월19일

PHOTO COURTESY OF MAGNOLIA PICTURES

Shin Sang-Ok, Kim Jong-Il, and Choi Eun-Hee in *The Lovers and the Despot*, a Magnolia Pictures release.

The film serves less as a political commentary or opinion piece about the highly contentious subject of North Korean government and international action, and more as a transfixing thriller that happens to be grounded in reality. Though the film does an adequate job with pacing, visuals, and of obtaining interviews from relevant characters, it does not set itself apart as anything more than a vehicle for a truly compelling real-life narrative. Despite these shortcomings and a very sub-title heavy narration which might deter viewers, the film demands to be seen, if not for its thrilling story, then at the very least for the strangely intimate peek it provides into North Korea and its infamous despot, Kim Jong-Il.

MOVIE REVIEW

How a nuclear missile and falling socket almost obliterated Arkansas

A suspenseful cautionary tale about a near-nuclear disaster on U.S. soil

★★★★☆

Command and Control

Directed by Robert Kenner

Not Rated

Now Playing at the Kendall Square Cinema

By Karleigh Moore
EDITOR

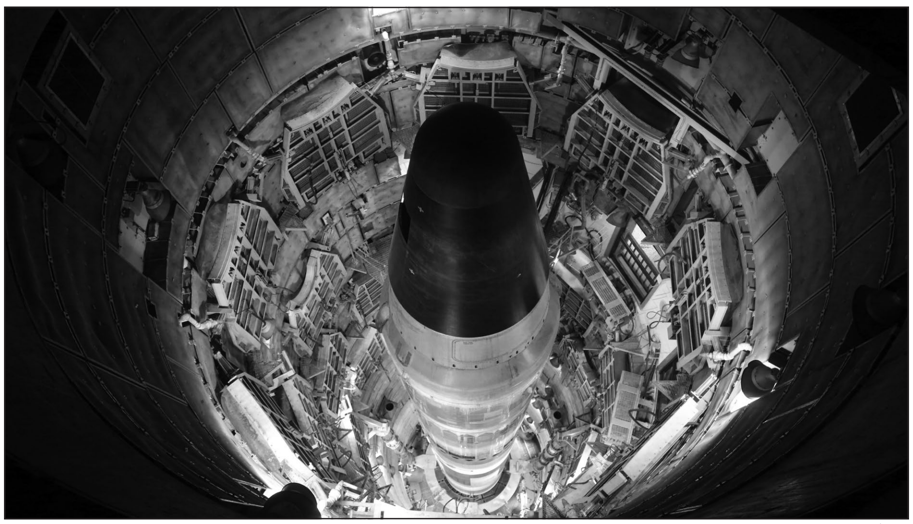
On September 18, 1980, Arkansas was almost obliterated when a mechanic dropped a heavy socket down a shaft, puncturing the fuel tank of a Titan II missile carrying a nuclear warhead. If nothing else, this documentary will inspire engineers striving to build redundant, foolproof safety measures on their dangerous devices.

Command and Control combined interviews and eyewitness accounts from the airmen and mechanics involved, congressmen, and the then-Secretary of Defense Harold Brown, to tell the story of the narrowly avoided catastrophe in Damascus, Arkansas. The documentary is based on a book of the same title by Eric Schlosser, who is also interviewed in the film.

Several haunting facts are dropped throughout the film, including that when the first atomic bomb was to be detonated, the engineers had concerns that the explosion might ignite the Earth's atmosphere. It didn't stop them from detonating the weapon anyway. Also included: while the U.S. government claimed there were only 32 nuclear weapons mishaps during the Cold War, the actual number is over a thousand.

The story is exciting because the U.S. nearly faced a nuclear catastrophe and seemingly no one knew about it — the government told everyone that the missile wasn't armed with nuclear weapons, and no one pressed further. It certainly isn't something people talk about today. As the film takes us through the events of September 18, 1980, we feel anticipation and fear right along with the crew. Had the warhead exploded, it would've caused an explosion 600 times more powerful than the atomic bomb dropped on Hiroshima.

The filmmakers recreate key events from the night, allowing us to watch in slow motion as the socket tumbles down 70 feet, puncturing the missile and causing the silo to fill with rocket fuel. We can empathize with Airmen David F. Powell and Jeffrey L. Plumb (the mechanics) as they look on in horror. With the fuel filling the silo chamber, there was a huge risk that the missile would explode.



COURTESY OF AMERICAN EXPERIENCE FILMS/PBS

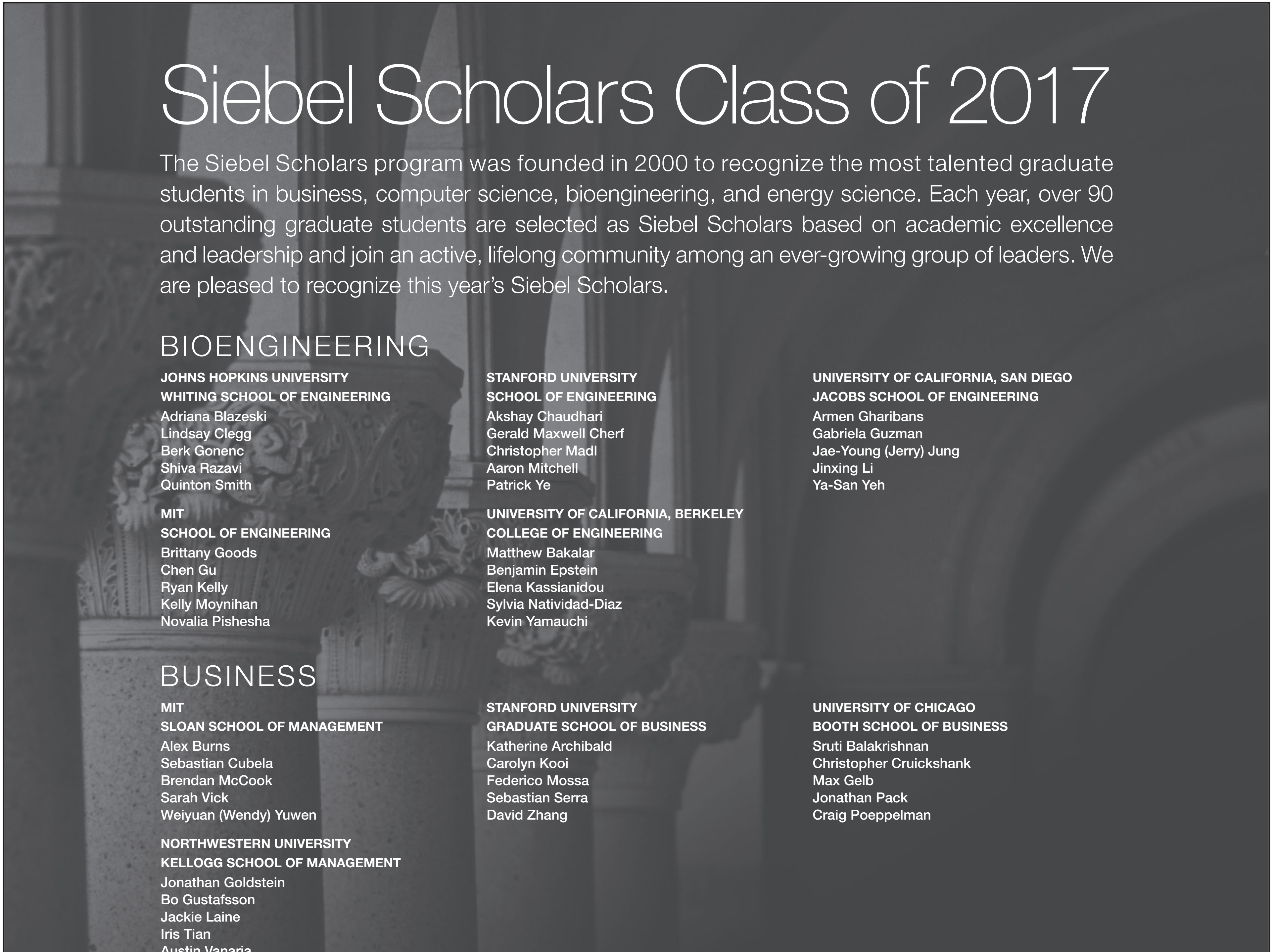
A Titan II missile exploded in Arkansas.

The bomb did explode that night, but luckily — and some of the interviewees did attribute this to luck — the nuclear warhead did not.

According to the film's press notes, Kenner said that making this documentary "was an opportunity to make a young generation aware of the dangers that our nuclear arsenal presents not only to our enemies, but to ourselves as well." Indeed, the documentary comes across as a cautionary tale.

The documentary was filmed at the Titan Missile Museum in Green Valley, Arizona which is the only remaining Titan II site.

If, like me, you grew up watching documentaries on the History Channel, or if you liked Director Robert Kenner's *Food Inc.*, you'll enjoy *Command and Control*.



Siebel Scholars Class of 2017

The Siebel Scholars program was founded in 2000 to recognize the most talented graduate students in business, computer science, bioengineering, and energy science. Each year, over 90 outstanding graduate students are selected as Siebel Scholars based on academic excellence and leadership and join an active, lifelong community among an ever-growing group of leaders. We are pleased to recognize this year's Siebel Scholars.

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Gerald Maxwell Cherf
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Patrick Ye

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Vipul Venkataraman

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Paul Narchi

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Janam Jhaveri

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A climate ethics forum will convene this November

"Living lab on campus energy usage" will keep MIT on track to hit carbon-neutral goals

Climate, from Page 1

Members include the heads of ESI, MIT Energy Initiative, and the Climate Colab, as well as two each of grad students, undergrads, postdocs, and alumni. Additionally, there are three MIT Corporation members and one representative from FFMIT, as was promised to them in March following negotiations.

In March, Zuber's team approached the Undergraduate Association's Sustainability Committee, the GSC's Sustainability Subcommittee, and FFMIT to help them "solicit statements of interest from students who wanted to be considered for the CAAC," Tom Kiley, senior advisor to Zuber, said. Students who submitted statements then had to explain to the VPR office why they were interested in joining, and the representatives were selected from among this group.

Zuber to convene forum on ethics of climate issues.

The forum will take place Nov. 17.

The topics under discussion were determined by FFMIT students with input from faculty of the philosophy department, and include subjects such as individual responsibilities in promoting sustainability.

"Everyone [in the MIT community] I talked to," Zuber said, "believes that climate change is a serious issue."

MIT aims to reach carbon neutrality on campus ASAP, has set minimum goal of 32 percent reduction by 2030

To quantify and keep track of progress made toward reducing carbon emissions, the Office of Sustainability will be setting up a living lab on campus energy usage. They have also teamed up with Zuber and faculty from EAPS to analyze campus climate resiliency in the face of possible flooding and stormwater surges.

Out of all the provisions in the plan, establishing low-carbon energy centers is coming to fruition the fastest, Zuber said.

These centers bring together cross-disciplinary teams to work toward solving the energy crisis. The centers for solar and nuclear research were established first.

"In the first year... the focus has been on developing the structure of the centers, solidifying areas of research, and beginning to recruit members," Kiley said.

For five of the eight planned centers, co-directors have already been named: solar; materials for energy and extreme environments; carbon capture, utilization, and storage; energy storage; and energy bioscience all have two appointed directors. Three more centers each have one director appointed thus far.

The biggest barrier for global climate action, Zuber said, could be political rather than technological -- though not so much from within MIT, she said.

"You gotta take care of your own house," she said, adding that one of the most important aspects of the plan is the fact that MIT made a stand for the significance of climate issues.

"We don't want to be alarmist," she said, adding that "we have to be realistic" and cannot claim success just from keeping temperature change below 2C, as stipulated in the multilateral Paris climate change agreement issued last fall.

Zuber and advisory committee to develop guidelines for engagement with industry, government

MIT recently joined the Carbon Pricing Leadership "in response to the community's expressed opinion," Zuber said.

MIT and Yale are the only two unviersity members in this organization, which aims to hold accountable those responsible for the negative externalities of carbon emissions.

At the upcoming SOLVE conference, Zuber said, one of the questions that will be considered is how new technology such as bitcoin can be used in carbon pricing.

General Electric sent department heads to MITEI to be updated on the state of actions taken to address climate change, and has committed $7.5 million over a five-year period to cooperating with MITEI on tackling the issue.

Earlier this year, GE moved its headquarters to Boston to "become part of the community and recruit talented students," Zuber said.

Moving forward

To measure whether their efforts are having an impact, Zuber and her team will use a combination of evaluation standards to monitor the success of the many programs and initiatives.

For research initiatives, she said, they will use the "typical metrics" of publications and citations.

For other programs, she will ask the advisory committee to consider the question of "what would have happened if [they] hadn't initiated" the plan.

Of interest to students may be the new Minor in Environment & Sustainability, planned for launch next fall.

The Alumni Fund has fully funded ESI's development of the minor, Zuber said.

In addition to the minor, the ESI has offered "packaged themes" to GIR lecturers, who can then incorporate modular environmental topics into their curriculums.

Next month is the anniversary of the plan. As stated in the plan, Zuber will release an official progress update during that time.

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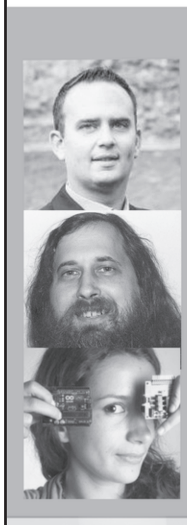

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Dr. Richard Stallman -Launched the free software movement in 1983 and started the development of the GNU operating system in 1984.

Stefania Druga -Founder of Hackidemia, graduate student at the MIT Media Lab, Life- long Kindergarten Group and former Googler.

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Rosetta to land on comet, ending 12-year mission

Mission's project scientist: data show 'comets are much more puzzling than we expected'

By Kenneth Chang
THE NEW YORK TIMES

When the spacecraft makes a gentle belly flop onto the comet Friday, it will bring to an end to the most ambitious mission ever for the European Space Agency. Since its arrival in August 2014 at Comet 67P/Churyumov–Gerasimenko, Rosetta has been sending reams of data and exquisite photographs of the comet, providing insights and surprises about one of the fragments left over from the formation of the solar system 4 1/2 billion years ago.

On impact, Rosetta will switch off its radio transmitter, leaving silence at the end of its 12-year journey.

"As soon as we lose contact with the spacecraft, that's the end of Rosetta," said Matt Taylor, the mission's project scientist. "It's a nice appropriate line to be drawn, I think."

After Rosetta lands, with no more data coming back, mission controllers will never know the craft's exact fate.

Shutting off the transmitter avoids any possibility of Rosetta's interfering with the deep space communications of other spacecraft. And even if the transmitter were kept on, the antenna would almost certainly be jostled away from Earth by the impact of the landing.

"We will not be able to communicate in any case," said Patrick Martin, the mission manager.

The scientists will also finally have time to analyze what they have collected. "We've only touched the tip of the iceberg in terms of digging through the data," said Joel Parker, a scientist at the Southwest Research Institute in Boulder, Colorado, and deputy principal investigator for an ultraviolet spectrograph on Rosetta. "It's been so busy doing operations that a lot of us haven't even had a chance to dig into our own instrument data as much as we would like."

Here is some of what has already come out of Rosetta.

Comets Can Stick Together

The first surprise from the initial images of Comet 67P was that it was not round — it looked more like a rubber ducky. That immediately raised the question whether the strange shape was the result of erosion or whether it was originally two comets that bumped into each other and stuck.

Exposed plateaus on the surface provide an important clue that Comet 67P was originally two comets. "It's akin to looking at the skin of an onion," Taylor said. "Looking at the orientation of these layers, it's clear this has to be two objects that have collided."

That in turn has additional implications on how the interior is packed together and how much it could have heated.

Rosetta's cameras have also captured what scientists called "goose bumps," objects about a yard wide that are the building blocks of the comet. "This is one of the major things that came out of Rosetta, this aspect of how the comet was put together," Taylor said. "It means comets are much more puzzling that we expected."

Blinded by the Comet

In Rosetta's early observations, Rosetta scientists were puzzled by the lack of much ice on the comet's surface. After all, comets have long been known as "dirty ice balls."

Comet 67P is not a particularly bright comet. Even when it reached its closest proximity to the sun, in August last year, it was not visible to the naked eye by people on Earth. But as expected, the comet became much more active. As the comet spun around once every 12 hours, frost formed and disappeared on parts of the comet. Periodically, jets of gas and dust erupted.

Taylor said that it appeared that dust on the surface acted as insulation, holding onto the heat during the day that warms ice below, producing gases that rise to the cold surface, freezing again as frost.

The jets appear to be the consequence of cliff walls crumbling, exposing ice that then quickly vaporized.

The bursts released so much dust that Rosetta's star trackers, cameras that keep track of the spacecraft's position by looking at the background of stars, were confused. After that, the mission managers moved Rosetta farther away from the comet. "We had to change the way we ran the mission," Martin said. "This was my main challenge."

Parker said that not all dust from Comet 67P was the same. Some particles are fluffy and fragile, and others are more solid pieces. "These different kinds of dust seem to come from different processes," he said. The fluffy dust comes from all over the comet, he said, while the consolidated particles seem to come from specific regions.

With the comet now much quieter, Rosetta has moved closer, within 1.2 miles of the surface.

"Everything is going well in this final phase of Rosetta," Martin said. "The spacecraft hardware is in rather good condition."

Water Not Like the Oceans

Where did the water in Earth's oceans came from? No one knows.

But scientists now know for sure that it did not come from comets like Comet 67P. Rosetta measured the fraction of deuterium — a heavy form of hydrogen — in the stream of water molecules coming off, and it was much higher than that found in Earth's water.

The current 6 1/2-year orbit of Comet 67P takes it as far out as Jupiter and even at its closest approach to the sun, it is still outside Earth's orbit. Planetary scientists are sure Comet 67P originated much farther away, beyond Neptune's orbit, in what is known as the Kuiper belt, and was nudged into the inner solar system, probably by a collision or close gravitational interaction with another object.

The presence of molecular oxygen, for example, suggests that the comet formed in a very cold region. "It was fully unexpected," Taylor said. "We don't expect to get oxygen because it likes to do stuff with other things. It's a very friendly molecule, and it likes to jump and become something else."

The water finding suggests that Kuiper belt comets are not the source of Earth's water.

The End

In the final days, Rosetta is being moved into orbits that are more elliptical. One final maneuver will put it on a collision course with Comet 67P, the minuscule gravity pulling the spacecraft for a final embrace.

The landing site is on the head portion of the comet, near some intriguing pits. The aim is not to land in one of the pits, just to pass over them, but it is possible that Rosetta will end up in one of them.

Martin said he was ambivalent as Rosetta approached its end. "I'll be very sad, of course," he said. "We will celebrate the achievement of such an exciting mission."

Parker said the scientists got what they came for. "We had high hopes, and it went even higher than that," he said. "It's been a wild ride."

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Sorority drew in upperclassmen

Eleven members currently live in the new house, across ten rooms

DPE, from Page 1

Phanse noted the diversity in the members' backgrounds and interests as features that may draw in new chapter members. "We understand how at first sororities might seem a little scary," she said. "We understand everyone has a different community, we just want everyone to feel at home while they're here." Most of the current members of Delta Phi Epsilon joined as sophomores and juniors.

Looking to the future, Phanse said that members are excited about a gala the chapter will be hosting in early December to raise money for cystic fibrosis treatment, along with other events planned for new members.

Solution to Saturday Stumper

from page 5

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Solution to Say Sew

from page 6

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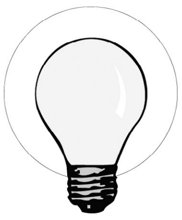

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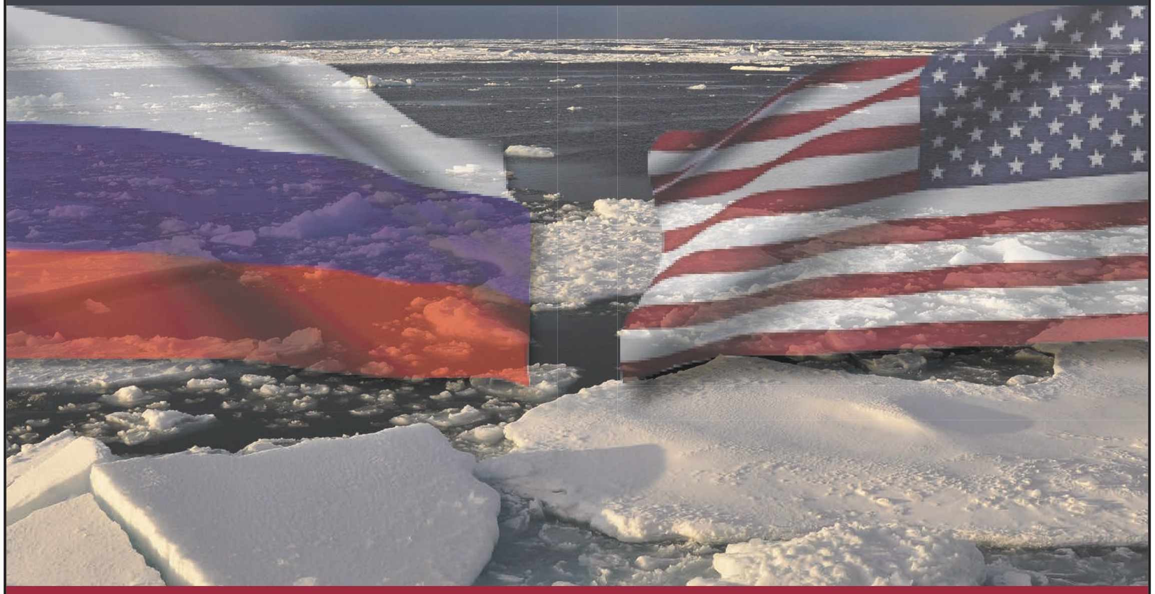

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TENNIS

Lara Rakocevic '20 makes last eight at ITA regional meet

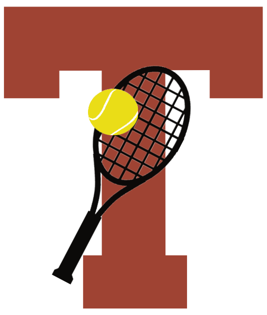
Rakocevic overcame both the 7th and 9th seeded opponents

By Souparno Ghosh
SPORTS EDITOR

Lara Rakocevic '20 made it to the quarter finals of the Intercollegiate Tennis Association (ITA) regional meet held at MIT this past weekend. Not only was the freshman, the Engineer's top performer in singles, she was also the only player from the New England Women's and Men's Athletic Conference (NEWMAC) to reach the final eight.

Fourth seed and captain Dora Tzeng '18 made it to the round of 16 in singles while Rakocevic teamed up with Kelly Zhu '19 to lead MIT with a top -16 finish in doubles.

Looking back on her incredible performance, Rakocevic said, "I was proud of myself for making it as far as I did. I am a little bit bummed that I did not play better in the quarterfinals as I was a little bit tired and intimidated."



En route to the quarter final Rakocevic saw off 9th seed Lily Bondy of Middlebury (7-6, 1-6, 13-11) and 7th seed Mina Karamercan of Tufts University (6-3, 7-5) before succumbing to top-seed Eudice Chong of Wesleyan University.

A four-time Oregon state champion Rakocevic had come into the meet having won all 5 of her singles' games for MIT and if her performance at the ITA regionals is any indication the Engineers have added a player of exceptional ability to an already talented roster.

In true spirit of MIT , Rakocevic has already identified areas to work on in her game and recognizes the kind of mentality needed to face a higher ranked player.

Rakocevic learnt, "She is just a girl with a ponytail. She will also mess up. She will also get nervous. Just because she is higher in the rankings doesn't mean I should give her points or games for free. She still has to earn everything just I like do."

When asked how challenging it has been to balance academic life at MIT with the rigors of playing varsity tennis, Rakocevic remarked, "I am really enjoying it. It [Varsity tennis] gives me a lot of structure and makes me prioritize my time so I always know [that] I have classes at a certain period of the day and then I have to study and then I have practice. That really helps me be efficient and focus on what I have to do."

PING XU

MIT lost to Rensselaer 10-31 on Saturday, Sept. 17.

PING XU

MIT sailed in the Hatch Brown Trophy regatta on Saturday, Sept. 17.

CROSS COUNTRY

Freshmen excel in season's first cross country meet

Megan McCandless '20 clinches first place in her maiden appearance as an MIT Engineer

By Daniel J. Newman
SPORTS STAFF

The MIT men's and women's cross country(XC) teams got off to good starts this past weekend in the Purple Valley Classic at Williams College. Competing against many of the top teams in the country, the women finished in 2nd place overall while the men finished in 3rd.

In cross country, the men compete in an 8k race while the women run a 5k or 6k race. The top five runners from each team score and their places are summed up. The team with the lowest total score wins.

A strong recruiting class of freshmen gives MIT one of the best squads in the country, as both the women's and men's teams are ranked in the top 6 nationally.

On the women's side, Megan McCandless '20 finished 1st overall at the Purple Valley Classic. The promising freshman from Livermore, CA has the potential to be one of the top runners in program history.

Fellow freshmen Jenna Melanson '20 and Katie Bacher '20 joined McCandless in the Engineer's top 5, along with Leandra Zimmerman '19 and junior Mary Eccles '18. MIT also has in its ranks two All-American runners, Christina Wicker '17 and Maryann Gong '17, who were out injured this past meet.

"I really want to be a part of the team that goes to nationals this year," said Jenna Melanson. "I want to contribute to the program in a valuable way, and helping us earn another trophy at nationals would be a really cool way to do that."

In terms of balancing the rigors of being a student-athlete, Melanson is excelling so far.

"Throughout my senior year of high school, I had a lot of people tell me that trying to be an MIT student and an athlete at the same time would be extremely stressful and lead to a bad college experience. Obviously it's still early in the semester, but so far I feel that XC has made MIT easier. Having a team to support you and help you learn how things work is so nice. Plus, practice is like a forced study break. When I get really frustrated on a pset I can just leave it and come back to it after I run."

On the men's side, the top performance of the weekend came from Josh Derrick '20. Derrick finished 8th overall and was joined by Steven Goldy '20, Dennis Maloney '19, Colin Godwin '17 and Matt Deyo '17 in the Engineer's top 5.

Derrick, who says he came to MIT because "I was scared of saying no to Coach [Halston] Taylor," ran the 4th fastest time ever by an MIT athlete on the course. In the process, Derrick accomplished his season goal, which was to "beat Dennis Maloney in one race."

"My favorite part of XC is how it develops a bond, trust, and respect between your teammates who are all busting their asses towards the same goal," says Rory Beyer '17, who is a senior and also a captain. "It makes you tough, and makes you closer to those on your team through the joint struggle."

"I like XC because it allows you to test yourself and pushes you to new limits that you had no idea you could achieve," sais Daniel Weiss '18. "All the while, you're doing it with a group of amazing, like-minded people. It's simply a lot of fun when you get past the pain."

The Engineers will look to build on the strong start to the season at the NEICAA Championships at Franklin Park on Oct. 8.

Want to see these teams battle it out in person?
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SPORTS BLITZ

Football (1-3) claimed its first win of the season away at Maine Maritime 30-13. QB Udgam Goyal '19 went 13-21, 229 yards, 2 TD, 0 INT. WR Eddie Garcia-Montes '19 had 170 receiving yards with a TD.

Sailing took third overall in St. Mary's Fall Intersectional. In Division A, the team of Ty Ingram '18 and Sameena Shaffeeullah '19 finished 2nd.

Women's tennis (6-0) defeated Clark University 9-0 for its fourth whitewash of the season.

Women's soccer (7-3) won away at Tufts University. Olivia Struckman '18 scored her team-leading sixth goal of the season.

Women's volleyball (13-3) won a thrilling 5-setter against Clark University. Four engineers recorded double-digit kills with Meghan Gebhard '17 leading the team with 17.

Field hockey (7-2) dropped a close game at Amherst College 2-1. Emily Penn '18 scored the Engineer's only goal.

Men's soccer (4-4) lost 2-1 to national champions Amherst College. Ryan Stuntz '18 scored for the Engineers.